

THE SHELL-BARK HICKORY MEALY-BUG.

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Pseudococcus jessica, sp. nov.

The writer names this new species of Coccidæ in honour of his wife.

Young Larvæ.—About .5 mm. long when born, and covered with a thin, transparent egg-shell; about .25 mm. wide; oval, broadly rounded at cephalic end and slightly tapering from the fore part of abdominal region to the anal lobes; anal lobes each bearing one short hair; colour: reddish brown on dorsal surface, but orange-brown on the ventral surface, due to the colour of the legs and antennæ; with transmitted light through prepared slides the body appears orange-brown; antennæ six-segmented, bearing numerous hairs; eyes reddish or purplish in colour and situated just behind the peduncles of the antennæ; quite active; body covered with a fine, white, powdery, waxy secretion except at articulation of body segments.

Adult Female.—4 to 6 mm. long; 2 mm. high; 2.5 mm. broad; generally hemispherical in outline, flattened ventrally, and sometimes dorsally when crowded between the bark and wood; colour: purplish blood-red (about the same as that of the woolly aphis—*Schizoneura lanigera*) covered with a relatively thick deposit of white, waxy, secreted powder; *no* lateral fringe of white waxy exudation, nor any hairs, nor secreted waxy, glassy filaments as in certain other mealy-bugs; segmentation of body delineated by thinner secretion of powder wax at those places of articulation; no ovisac is formed, the embryos being laid at caudal end of body under the parent; legs and antennæ reddish brown; when boiled in 10% KOH the bodies of the adults turn deep blue-black and colour the KOH a blood-red.

The *males* have not been observed.

Locality.—Columbia, Mo.

Habits.—It takes the young about fifteen minutes after birth to free themselves from the thin, membranous egg-shell which envelopes them. They have *no* powdery secretion when they first emerge from the pellicles. The young larvæ have the habit of congregating in masses when not attended by their common "shepherds," the little black ant (unidentified). In their natural

habitat, under the shaggy bark of the shell-bark hickory (*Hickoria ovata*), the ants do not allow them to remain any great length of time where they are born, but are transferred by them to the terminal or lateral twigs of hickory shoots at the base of the tree, or are transferred to similar situations on the old tree itself, where the bark is tender, such as occurs at the junctures of the leaf petioles with the twigs or at any abrasion or crevice in the bark, and here they are guarded and attended by a few of the ants which watch with all the dexterity and aggressiveness they possess. Here they remain until fall, feeding on the sap, and are "herded" by the ants when cold weather sets in, probably being taken into their nests where they hibernate, or possibly some few crawl under the bark and into crevices of the older bark where they pass the winter in these locations. In early spring, as soon as warm weather comes to stay, the larvæ are transferred by the ants to the tree, under the hard protecting bark, where they commence feeding and growing. They apparently become full-grown and mature by about the middle of July in this latitude, for adult females were examined on the 12th July and they were full of embryos. The first larvæ were observed on the 28th July, and they continue to lay eggs up to the middle of September (1915) and probably even later.

This is the largest *Pseudococcus* of which the writer knows, and its size and host plant are enough for ready identification. This scale insect is invariably attended by certain common black ants and the Coccidæ are generally in groups of two or three, but sometimes as many as ten are grouped under a slab of bark only six inches in diameter. This gregariousness in habit probably occurs because the ants can collect an abundance of "honey-dew" from the colony without any great difficulty, thus saving time and energy on the part of the ants. As many as fifty ants have been observed encircling one female adult, and as many more were crowding around to get their meal of secreted fluid. When disturbed by the removal of the bark, the ants would run around frantically with the tips of their abdomens elevated and their mandibles extended, making a most formidable appearance. The Coccids are generally located between the bark and wood where

there is just enough room for them to expand to their maximum development, and where the ants have easy access to the food-supply of secreted liquid. The writer has, however, occasionally found an isolated female scale which had been protected from external agents by the ants building up walls of frassy material from the wood of the tree to the shaggy flake of bark which had weathered away from the Coccid, thus exposing it to the attacks of predacious or parasitic insects until such a protection had been built by the ants. Through this wall of protective material were several entries or exits, as the case might be, for the ants to go to their "cows."

Natural Enemies.—While collecting this scale insect, the writer has found several Syrphid spp. larvæ in close conjunction with the sides of the scales, apparently feeding on their bodies. Insects thus attacked were partially shrivelled, but still alive and attended by the ants as usual. In a few cases the Syrphid larvæ were completely covered by the adult scale, probably having wormed their ways beneath the insects. It would appear that the ants tolerate this intruder, but for what reason, the writer cannot definitely say, unless it is because the Syrphid larvæ also give off a sweetened secretion, or because the ants have not learned to distinguish between the scale and the fly larvæ, or because the intruder does not entirely destroy the secreting faculties of this coccid. Most of the Syrphid larvæ are apparently of one species, being salmon pink in colour, and about 3 mm. long and 1 mm. wide at time of observation (14 Aug., 1916). However, a large, flattish circular or slightly elongate creamy-white Syrphid larva, 4 mm. long and 3 mm. wide was also taken in connection with the scales, but none have matured to render identification possible. No parasitic Hymenoptera have been reared from this Coccid.

Remarks.—A smaller, differently coloured mealy-bug, possibly very close to this species is mentioned from the same host in Indiana, but is not fully described, nor is it named by the State Entomologist of Indiana in his 1910 report, p. 226.